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InterMax™ IX1600-P Industrial Ethernet Peer



User's Manual

1 SAFETY CONSIDERATIONS



Read this manual completely before installing the device. Make sure that all safety considerations are fully understood.

This device should only be installed by qualified personnel.

This device should be installed in a tool-only accessible enclosure or cabinet suitable for the environment.

This device uses convection cooling. Avoid obstructing the air vents on the top and bottom of the device.

Do not operate the device with the enclosure covers removed, this could cause a shock or fire hazard.

Do not attempt to disassemble the device. There are no user serviceable parts inside.

Do not expose the device to any kinds of liquids (rain, beverage, etc.) The device is not water-proof.

The input connectors should be screw secured to the device prior to operation.

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3 DEVICE OVERVIEW

The InterMax™ IX1600-P is an Industrial Ethernet extender with a built-in four port Ethernet switch. The IX1600-P is designed to repurpose existing copper infrastructure to transport 10/100BaseTX network traffic.

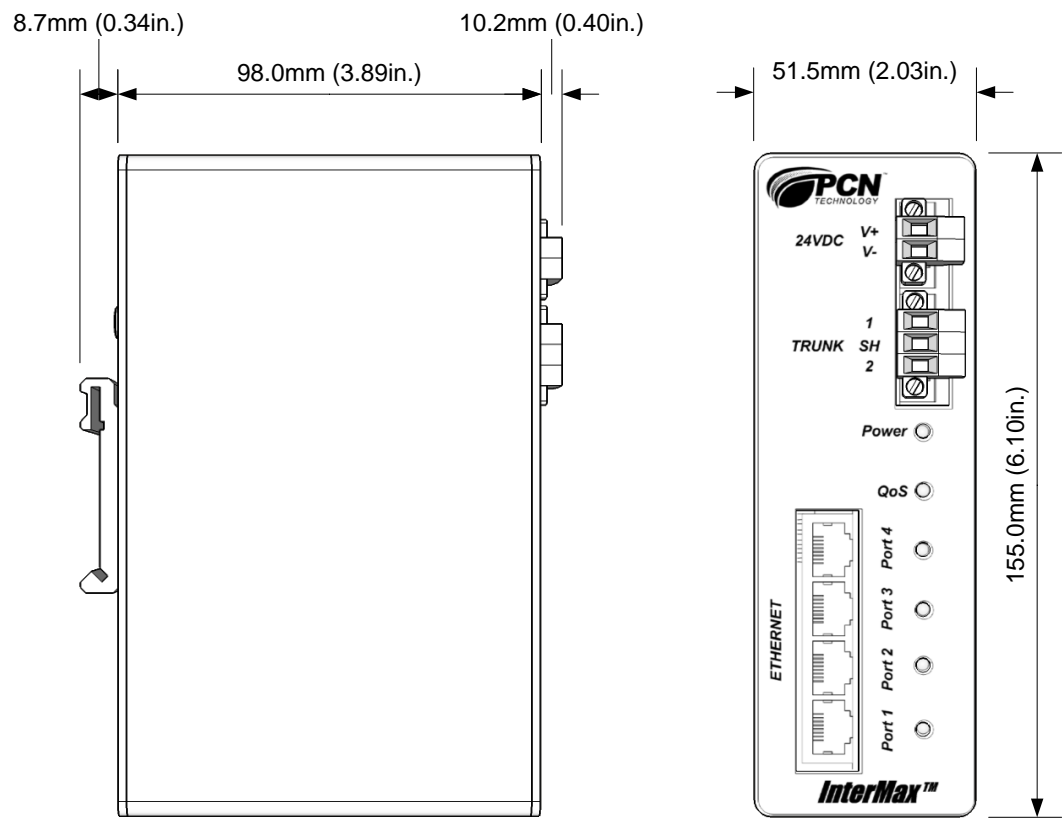
The IX1600-P is compatible with many different kinds of copper infrastructure cabling including, but not limited to: copper unshielded twisted pair (UTP), shielded twisted pair (STP), discrete conductors, multi-conductor, coaxial and twinaxial cables and slip rings including cabling types and infrastructure equipment used in RS-485 cabling, RS-422 cabling, Cat3-7 network cable, Belden 9463 "Blue Hose", RG-6, RG-58, HVAC, telephone systems, power distribution systems (power must be disconnected before repurposing), security systems, and automation systems.

The ruggedized IX1600-P is designed to operate in harsh environments and can be used in industrial applications.

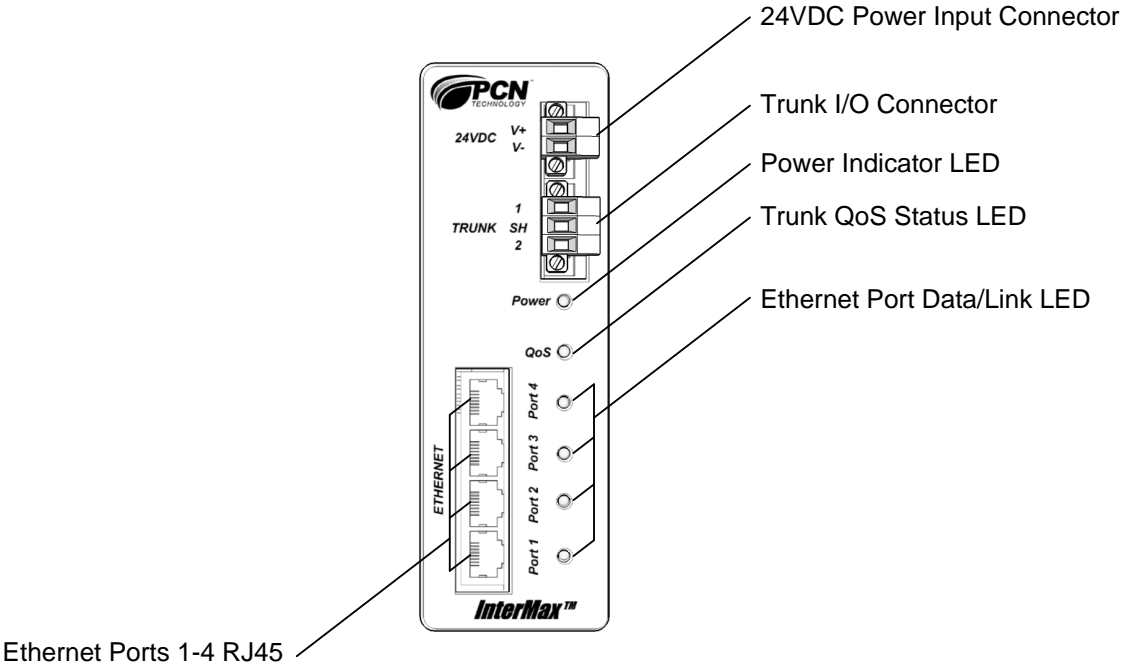
3.1 KEY SPECIFICATIONS

| High-Performance Industrial Ethernet Products | |
|---|---|
| Product Part #: | IX1600-P (Peer) |
| Dimensions | 2.0 x 6.1 x 4.1 inches (51.5 x 155.0 x 104.7 mm) |
| Weight | 1 lb 4 oz (0.567 kg) |
| Power | 24 VDC Nominal (18 to 30VDC) |
| Current Load | 24VDC Nominal @ 125mA (18 to 30VDC @ 170mA Max) |
| Operating Temperature | -20 Deg C to +60 Deg C |
| Storage Temperature | -40 Deg C to +80 Deg C |
| Humidity | 10% to 90% (Non-condensing) |
| LED Indicators | Power, QoS, Ethernet Data Link |
| Ethernet Ports | 4 RJ45 Ports |
| Communication Rate | 10/100 Base-T |
| Ethernet Latency | 2.5ms typical between Ethernet devices |
| Ethernet Jitter | 1ms maximum between Ethernet devices |
| Reliability | Reliability (MTBF): 50,000 hours |
| Air Pressure Operation | Air pressure (operation): 800 hPa ... 1080 hPa (up to 2000 m = 6562 ft) |
| Topologies Supported | Point to Point, Point to Multipoint (Star), Multi-Drop |
| Trunk Max Link | Up to 2000 Feet |
| Mounting Type | Din-Rail |
| Shock | IEC 60068-2-27; 15G@11ms, 3-Axis (Operational) / IEC 60068-2-27; 30G@11ms, 3-Axis (Non-Operational) |
| Vibration | IEC 60068-2-6; 5G @ 10Hz to 150Hz |

3.2 DEVICE DIMENSIONS



3.3 FRONT PANEL



3.4 CONNECTION SPECIFICATIONS

| 24VDC Power Input Connector | |
|-----------------------------|---|
| Operating Voltage | 18 to 30VDC |
| Rated Current | 170mA @ 18VDC; 125mA @ 24VDC |
| Rated Frequency | DC |
| Connection | Pluggable Terminal Block with Screw-Down Flange |
| Conductor Size | .05 – 3 mm ² (30 – 12 AWG) |
| Pinout | 1- “V-”, 2- “V+” |

| Trunk I/O Connector | |
|---------------------|--|
| Data Rate | Up to 200Mbps Raw Phy Rate* |
| Duplex | Half |
| Transmission Range | Dependent on conductor quality, distance, and environment* |
| Protection | Overvoltage, Overcurrent |
| Isolation to | Power |
| Connection | Pluggable Terminal Block with Screw-Down Flange |
| Conductor Size | .05 – 3 mm ² (30 – 12 AWG) |
| Pinout | 1- “Trunk Data 1”, 2- “Optional Trunk Shield”, 3- “Trunk Data 2” |

*See Performance Estimated for more information.

| Ethernet Ports 1-4 (RJ45) | |
|---------------------------|-----------------------|
| Ethernet Standard | IEEE 802.3 |
| Data Rate | 10/100Base-T Ethernet |
| Duplex | Full or Half |
| Transmission Range | 100m / 328ft |
| Isolation to | Power |
| Connection | RJ45 (x4 Ports) |

3.5 LED INDICATORS

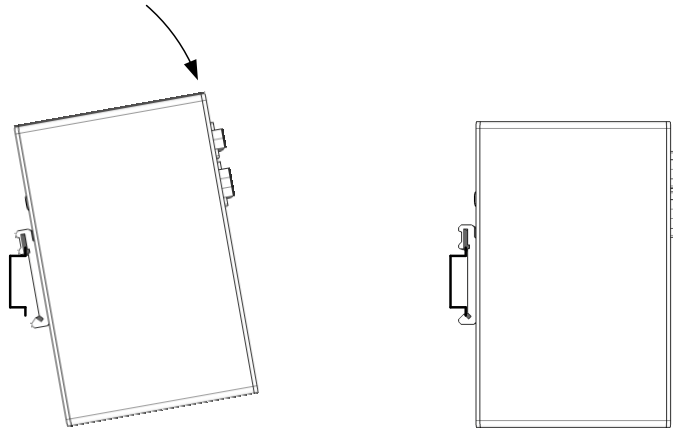
| Power Indicator | |
|-----------------|--------------------|
| Off | No Power Connected |
| On (Green) | Power Connected |

| Trunk QoS Status | |
|----------------------|----------------------------|
| Off | No Trunk Link |
| Green | Best (QoS > 75%) |
| Orange | Better (75% ≥ QoS > 40%) |
| Red | Good (40% ≥ QoS) |
| Flashing (Any Color) | Trunk Data Communication |

| Ethernet Port Data/Link | |
|-------------------------|-----------------------------|
| Off | No Ethernet Link |
| On (Green) | Ethernet Link Established |
| Flashing (Green) | Ethernet Data Communication |

3.6 MOUNTING

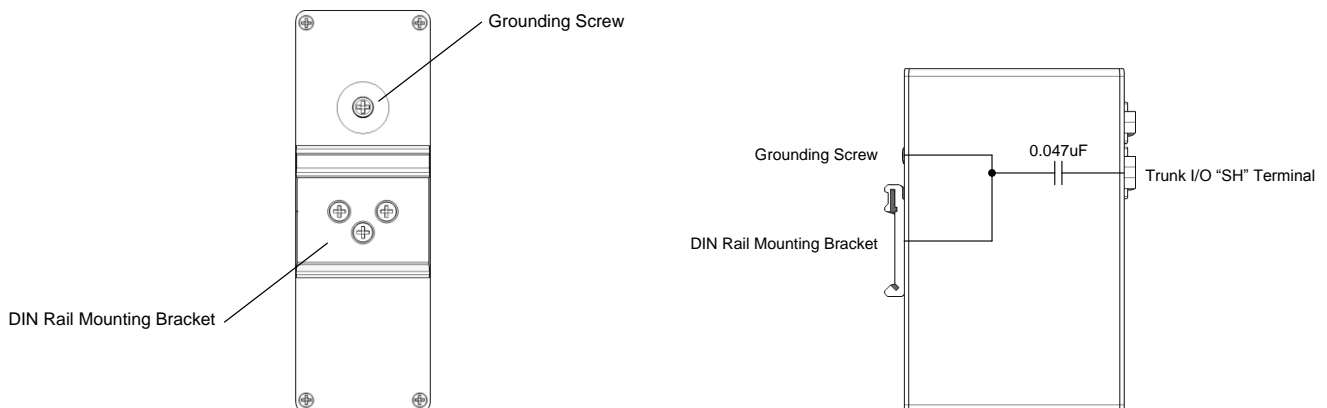
The IX1600-P comes equipped with a DIN rail mounting bracket for use with 35mm DIN-rail. To install, position the module with the top slightly tilted toward the DIN rail. Next, set the top of the mounting bracket on the top of the DIN rail. Applying a slight downward pressure, push the bottom of the module towards the DIN rail until a click is heard indicating successful mounting.



To remove the module, pull the bottom of the module away from the DIN rail while applying a slight downward pressure until the module becomes free of the DIN rail.

3.7 GROUNDING THE DEVICE

For the best noise immunity and emissions, the chassis of the IX1600-P should be connected to Earth ground. The device can be grounded via two methods: 1) via the grounding screw on the back of the unit or 2) via the attached DIN rail mounting bracket. If the DIN rail mounting bracket is used as the primary means of grounding, then it must also be confirmed that the attached DIN rail is also grounded to Earth ground.



The shield terminal of the Trunk I/O Connector (labeled “SH”) is capacitively connected to the main chassis via a 0.047uF capacitor. This provides a low impedance shunt to ground for high frequency noise on shielded cables, while helping to reducing DC ground loops. In some situations it may be necessary to connect the shield at only one end of the cable to further eliminate ground loops through the shielded cable.

3.8 APPLYING POWER

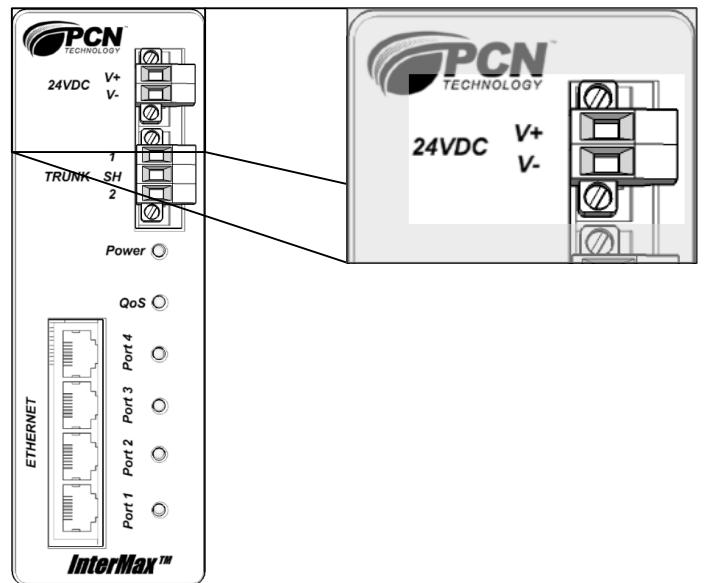
Power is applied via the 24VDC Power Input Connector on the front of the device.

Unscrew and remove the 24VDC Power Input Connector terminal block from the device.

Install the DC power wires observing the polarity indicated on the device.

Plug in the 24VDC Power Input Connector terminal block and screw secure.

Once powered, the LED indicators will flash momentarily as the boot up process completes. During and after the boot process, the Power LED should remain lit indicating stable power.

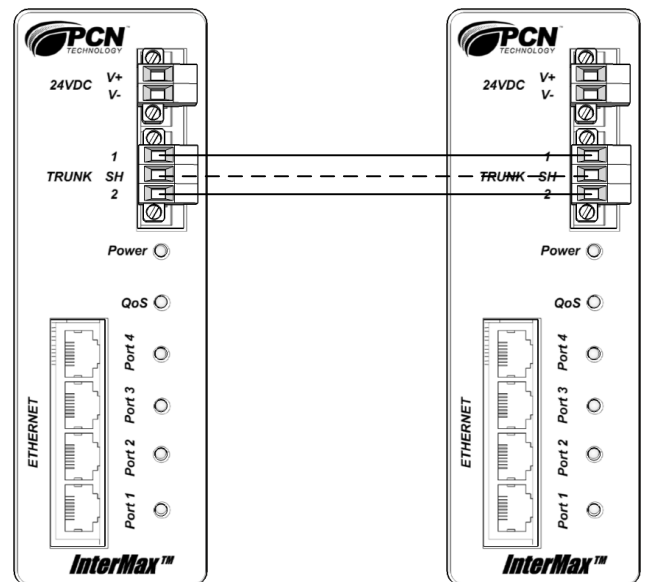


3.9 CONNECTING THE DEVICE

The IX1600-P is connected to other IX1600-P devices in the network via the Trunk I/O Connector.

All Trunk I/O Connectors in the system should be connected in the same polarity: 1 to 1, 2 to 2.

The optional Shield (mark "SH") should be connected to the drain wire of the cable if available. In some installations it may be necessary to connect the Shield on only one end of the cable (see Grounding the Device).



4 SYSTEM OVERVIEW

An InterMax™ IX1600-P System consists of more than one IX1600-P devices interconnected via a common Trunk cable forming a bridge network. This bridge network is used to transparently transport 10/100BaseTX network traffic between devices connected to the RJ-45 Ethernet ports on the IX1600-P devices.

Each IX1600-P features an embedded four port Ethernet switch. Ethernet devices connected to the ports on the same IX1600-P will have the best bandwidth and latency performance as the bridge network is not used for connections between the ports on the same embedded four port Ethernet switch.

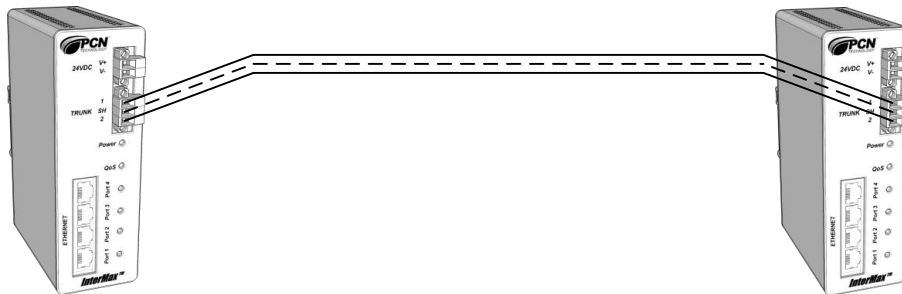
Ethernet devices connected to Ethernet ports on different IX1600-P devices will have variable bandwidth depending on the trunk cable type, trunk cable condition, number of IX1600-P devices connected to the trunk, and other environmental conditions (such as noise). Ethernet devices connected to different IX1600-P devices will also have an average round trip latency of approximately 2.5ms or less. This added latency is due to the time required for transportation of the 10/100BaseTX network traffic over the bridge network.

4.1 SYSTEM TOPOLOGIES

The InterMax™ system allows for several wiring topologies to be used. These wiring topologies include: Point-to-Point, Point-to-Multipoint (or Star), and Multi-Drop (or Line or Bus).

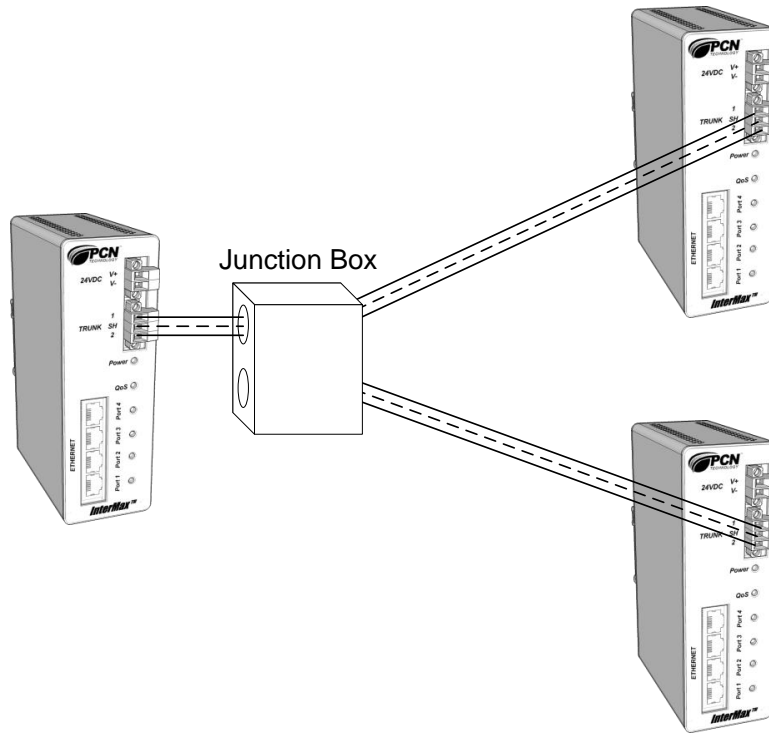
4.1.1 Point-to-Point

The Point-to-Point topology consists of exactly two IX1600-P devices connected via a shared trunk cable.



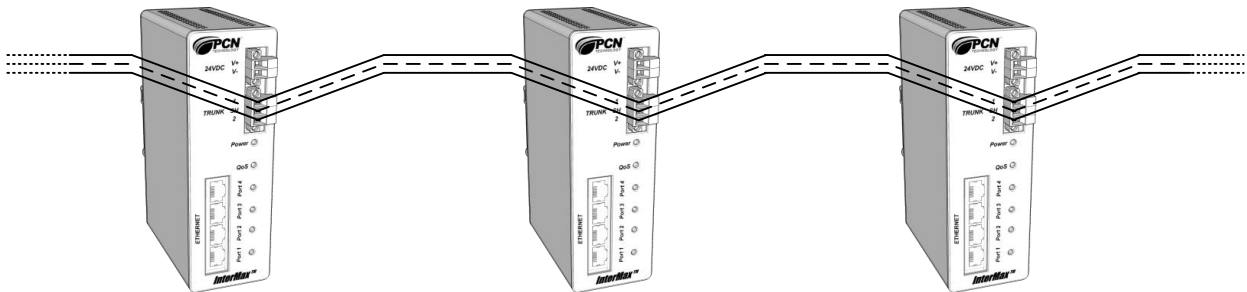
4.1.2 Point-to-Multipoint (or Star)

The Point-to-Multipoint (or Star) topology consists of more than two IX1600-P devices connected via individual spur lines tied together at a common connection point. This common connection point can exist near to one of the IX1600-P devices or somewhere more centrally located. In some instances it may be possible to join the spur lines directly at the Trunk I/O Connector terminal block – see connection specifications for the permissible conductor sizes. In most instances a junction box or terminal strip must be used to join the multiple spur lines.

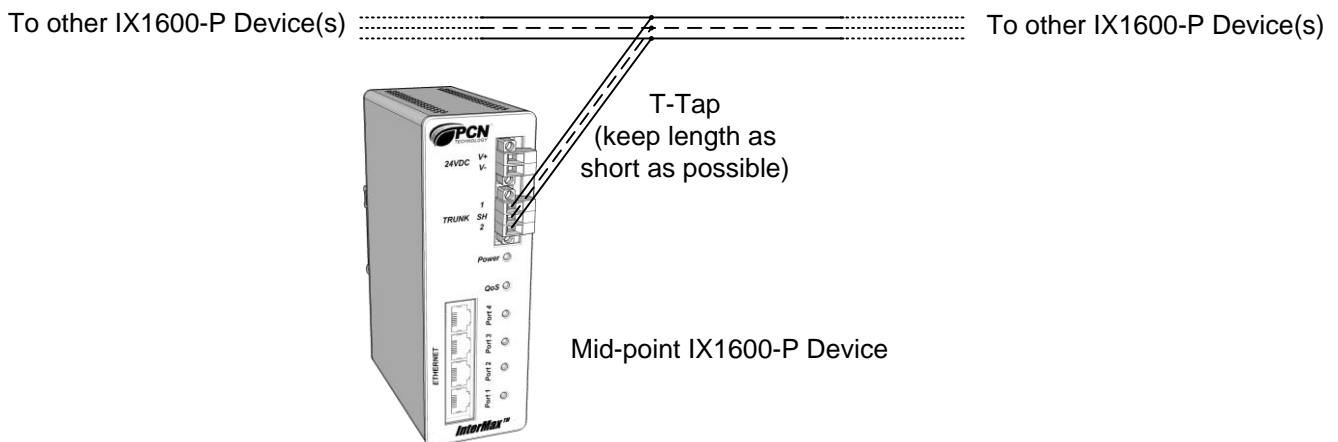


4.1.3 Multi-drop (or Line or Bus)

The Multi-Drop (or Line or Bus) topology consists of more than two IX1600-P devices connected via a shared trunk cable with exactly two end points. One IX1600-P device is connected to each end of the cable and one or more IX1600-P device(s) are connected at one or more midpoint(s).



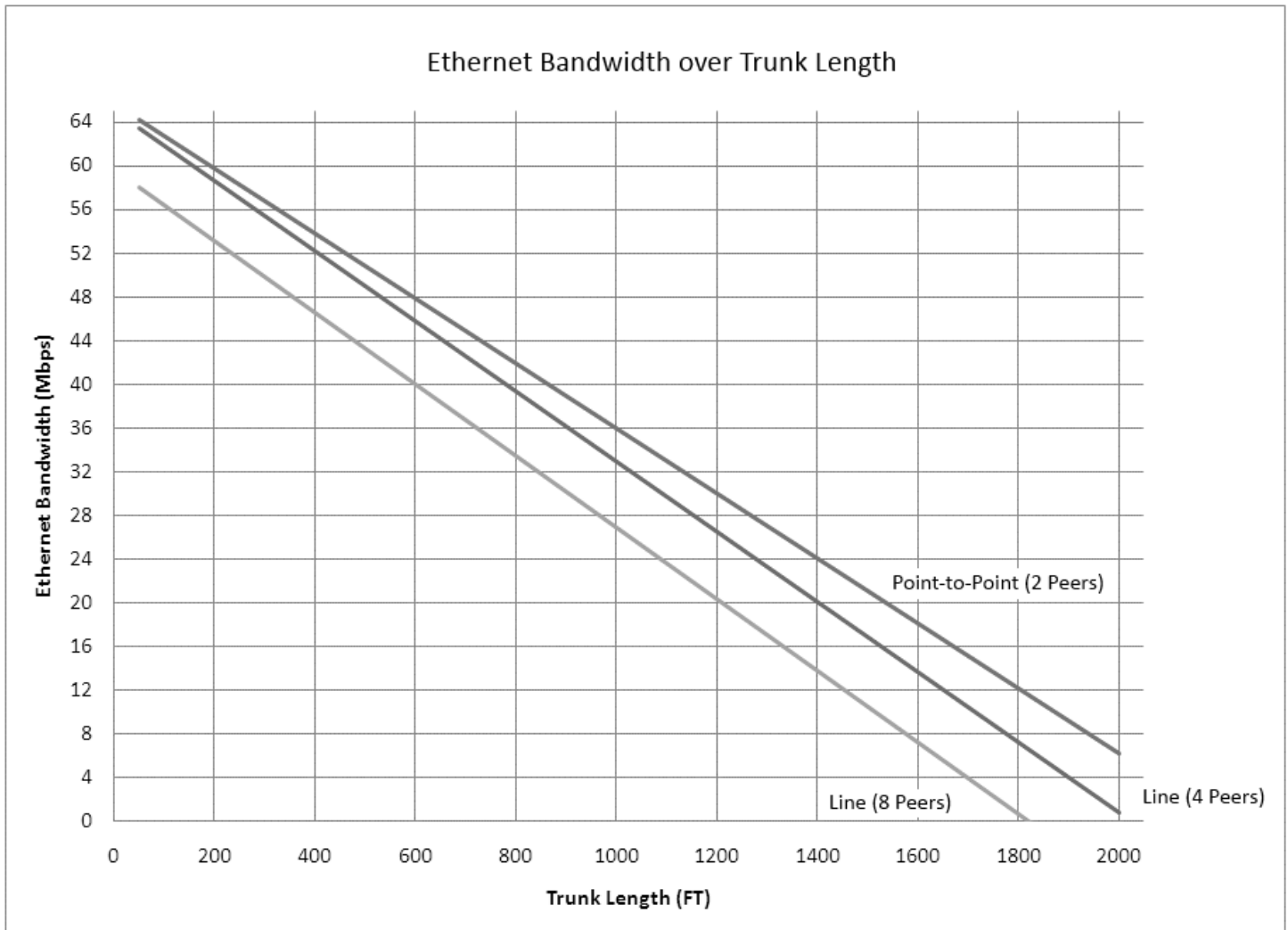
When possible, the midpoint connections should be made directly at the Trunk I/O Connector terminal block. If this is not possible, T-Taps may be used. The T-Tap length should be kept as short as possible.



4.2 TYPICAL PERFORMANCE

Ethernet devices communicating via the InterMax™ bridge network will see bandwidth performance which varies with the trunk cable type, trunk cable condition, number of IX1600-P devices connected to the trunk, and other environmental conditions (such as noise). Once installed, the performance should have little variability except with changes caused by external factors such as changes to the system topology, number of device connected, cable degradation, and changes to the environment such as noise fluctuations.

An example of bandwidth performance over trunk length for 22 AWG shielded twisted pair is provided below.



5 REGULATORY APPROVALS

| | |
|--------------|---|
| Safety: | UL 60950-1 INFORMATION TECHNOLOGY EQUIPMENT - SAFETY - PART 1: GENERAL REQUIREMENTS - Edition 2 - Revision Date 2014/10/14 |
| | IEC 60950-1 (2005) INFORMATION TECHNOLOGY EQUIPMENT – SAFETY – PART 1: GENERAL REQUIREMENTS - Edition 2 - Issue Date 2005/12/01 |
| | EN60950-1:2006 + A1:2010 + A11:2009 + A12:2011 + A2:2013 INFORMATION TECHNOLOGY EQUIPMENT - SAFETY -- PART 1: GENERAL REQUIREMENTS - Edition N/A - Revision Date 2013/10/01 |
| | CSA C22.2 NO. 60950-1-07 + AMD 1 AMD 2 INFORMATION TECHNOLOGY EQUIPMENT -- SAFETY. PT. 1, GENERAL REQUIREMENTS - Edition 2 - Revision Date 2014/10/14 |
| | Classification : NWGQ - INFORMATION TECHNOLOGY EQUIPMENT INCLUDING ELECTRICAL BUSINESS EQUIPMENT |
| EMC: | AS/NZS CISPR 22:2009 + A1:2010 |
| | FCC 47 CFR PART 15 SUBPART B |
| | ICES-003 ISSUE 5 |
| | EN 55022:2010 + AC:2011 |
| | EN 61000-3-2:2006 + A1:2009 + A2:2009 |
| | EN 61000-3-2:2008 |
| | EN 61000-6-2:2005 |
| | EN 6100-6-4:2007 + A1:2011 |
| Environment: | IEC 60068-2-6 Sine Vibration 10-150Hz |
| | IEC 60068-2-27 Shock Test Operational 15g |
| | IEC 60068-2-27 Shock Test Non-Operational 30g |
| | IEC 60068-2-1 Cold Operational -20°C |
| | IEC 60068-2-1 Cold Storage -40°C |
| | IEC 60068-2-2 Dry Heat Operational +60°C |
| | IEC 60068-2-2 Dry Heat Storage +80°C |
| | IEC 60068-2-30 Damp Heat +25°C to +40°C, 95% RH |

6 DECLARATION OF CONFORMITY

[Pending]

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